Washington State Department of Transportation

I-5 Southbound HOV Lane Pilot Project Task 4 Evaluation Report #1

Baseline Conditions Report

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Table of Contents

List of Tables

I-5 Southbound HOV Pilot Project
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PURPOSE

This report is intended to establish a baseline of existing conditions on the southbound I-5 corridor between the 134th Street interchange and the Interstate Bridge. These baseline conditions will be used as the basis to compare the effectiveness and impacts of the High Occupancy Vehicle (HOV) Lane Pilot Project between the 134th Street interchange and the Interstate Bridge when it is implemented in October 2001. Data will be collected at regular intervals after the HOV lane is operational. The future data will be compared against the baseline data contained in this report. This report analyzes baseline conditions for the time period of HOV lane operations (6 to 9 a.m.) and uses May and September 2001 information as the baseline timeframe.

EVALUATION (PERFORMANCE) MEASURES

An Interagency Team, comprised of representatives from the Oregon Department of Transportation (ODOT), Washington State Department of Transportation (WSDOT), C-TRAN, the City of Vancouver, Southwest Washington Regional Transportation Council (RTC), Tri-Met, and Metro, established the following performance measures to be used to evaluate the HOV Lane Pilot Project:

Operations – total person throughput, travel times (HOVs, Single Occupant Vehicles [SOVs], and freight), safety, enforcement, traffic impacts to parallel routes, and traffic operations at the beginning and ending transitions.

Modal Impact – HOV lane utilization, transit ridership, increase in transit service, number of persons per vehicle, Park-and-Ride use, vanpool use, employer programs.

Public Perception – Public perceptions of success. This will include survey results, phone calls, internet comments, etc.

This report describes the baseline conditions for each of these measures and is organized by Performance Measure category.

OPERATIONS

Total Person Throughput

This measure is the total number of persons traveling the corridor during the a.m. peak hour or period. **Table 1** shows the peak period mode shares of vehicles on southbound I-5 and estimates the total number of persons by mode based on counts taken in September 2001. Table 2 shows the peak hour mode shares of vehicles on southbound I-5 and estimates the total number of persons by mode based on counts taken in September 2001.

Future "post-opening" evaluation reports will compare the total number of persons carried in the corridor as well as the average auto and vehicle occupancies to the baseline data.

Table 1
Peak Period Mode Shares for Southbound I-5
Measured near 33rd Street

Mode	6 to 9 a.m. Number of Vehicles	Total Persons	Percent of Total Persons
Drive alone	7,695	7,695	76%
Carpool: 2-person	469	938	9%
Carpool: 3+ person	47	141	1%
Trucks	755	755	8%
Motorcycles	0	0	0%
Buses*	25	555	6%
TOTAL	8,990	10,804	100%

Occupancy counts (each mode's share of total traffic) taken May 16 and 17, 2001
Traffic counts taken September 2001
*Bus data obtained from C-Tran

Average auto occupancy = total number of non-transit persons/total number of non-transit vehicles

Average auto occupancy = 9,529/8,965 = 1.06

Average vehicle occupancy = total number of persons/total number of vehicles

Average vehicle occupancy = 10,084/8,990 = 1.12

Table 2
Peak Hour Mode Shares for Southbound I-5
Measured near 33rd Street

Mode	7 to 8 a.m. Number of Vehicles	Total Persons	Percent of Total Persons
Drive alone	2,669	2,669	74%
Carpool: 2-person	170	340	10%
Carpool: 3+ person	20	60	2%
Trucks	246	246	7%
Motorcycles	0	0	0%
Buses*	11	264	7%
TOTAL	3,116	3,579	100%

Occupancy counts (each mode's share of total traffic) taken May 16 and 17, 2001
Traffic counts taken September 2001
*Bus data obtained from C-Tran

Average auto occupancy	=	total number of non-transit persons/total number of non-transit vehicles
Average auto occupancy	=	3,315/3,105 = 1.07
Average vehicle occupancy	=	total number of persons/total number of vehicles
Average vehicle occupancy	=	3,579/3,116 = 1.15

Travel Times

Travel times are summarized for single-occupancy vehicles, high occupancy vehicles, and trucks (freight) in **Table 3**. Since there is no HOV lane in the baseline condition, it is assumed that all of the vehicles on southbound I-5 have the same travel time. Travel time by segment has been averaged over multiple observations made in September 2001 during the 6 to 9 a.m. period using the moving vehicle method described in the appendix of this report. The travel times were categorized for vehicles traveling on the corridor between the 134th Street interchange and the Interstate Bridge. Travel times were measured between off ramps.

Table 3
Travel Times
(Minutes: Seconds)

Segment	I-5 Vehicle Travel Time
99th Street to SR-500	4.5
SR-500 to Mill Plain Boulevard	1.6
Mill Plain Boulevard to Mid-Point I-5 Bridge	3.5
TOTAL TRAVEL TIME	9.6

September 18-20, 2001 Travel Time Average

Safety

Safety conditions are typically measured by summing the number of reported collisions. The Washington State Patrol (WSP) provided a detailed list of all reported collisions and call-outs on the southbound side of I-5 between 134th and the Interstate Bridge from 6 to 9 a.m. for the month of September (**Table 4**).

A secondary measure is also used to evaluate corridor safety. WSDOT operates an incident management service. As needed, the WSP dispatches incident response requests to WSDOT. WSDOT staff is available to respond to provide assistance to disabled vehicles, crash scenes, and other incidents. The number of callouts will be a measure of safety. **Table 4** details the number of WSDOT call-outs on the southbound side of I-5 between 134th and the Interstate Bridge from 6 to 9 a.m. for the month of September. This correlates the number of callouts for incident management, accident scene traffic control, etc. with the safety information needed to evaluate the project.

Table 4
WSP & WSDOT Incident Management Callouts

WSP Call-Outs	WSDOT Callouts on Corridor
On Roadway Incidents 4 property damage collisions 3 blocking disabled vehicles 2 traffic hazard reports	*On Roadway Incidents* 1 property damage collision
Off-Roadway Incidents 2 abandoned non-blocking vehicles 1 disabled non-blocking vehicle	*Off-Roadway Incidents* 0 Off-Roadway incidents

September 2001 data (I-5 SB 6 to 9 a.m.)

Enforcement

Another measure of the performance of the HOV lane is enforcement, or the violation rate of the HOV lane. For baseline conditions, the HOV lane is not operational; therefore, there are no HOV lane violations. The number and frequency of HOV lane violations will be reported once the HOV lane is operational.

Traffic Impacts to Parallel Routes

With increased delay in the general-purpose lanes, there is a potential that traffic could divert to parallel routes, such as Highway 99, Hazel Dell Avenue, and Main Street. **Tables 5 and 6** summarize baseline counts for all parallel north-south corridors of interest. By examining trends in traffic counts on parallel routes, the amount of diversion will be able to be measured during the Pilot Project. Data for the three-hour HOV operational period is included. The share of traffic on each facility at the screenline at 99th Street is summarized in **Table 7**.

Table 5
Southbound Traffic Counts on I-5

Time Period	I-5 south of 134th Street (1)	I-5 south of 99th Street (2)	I-5 south of 39th Street (3)
5-6 a.m.	1329	1613	1599
6 to 7 a.m.	2177	2998	3036
7 to 8 a.m.	2259	3292	3116
8 to 9 a.m.	2071	2934	2837
9 to 10 a.m.	1730	2301	2233

Counts Taken:
(1) September 18-20, 2001 Average
(2) September 18-20, 2001 Average
(3) September 18-20, 2001 Average

Table 6
Southbound Traffic Counts by Corridor

Time Period	I-205 (1)	Hwy. 99 (2)	Hazel Dell (3)	Main St (4)	Lakeshore (5)
5 to 6 a.m.	1799	114	40	43	NA
6 to 7 a.m.	4033	266	142	167	293
7 to 8 a.m.	5294	601	372	322	449
8 to 9 a.m.	4128	573	276	365	301
9 to 10 a.m.	3083	658	238	331	NA

Counts Taken:
(1) September 18-20, 2001 Average (ATR station near Mill Plain Interchange)
(2) September 25 & 27, 2001 Average (south of NE 99th Street)
(3) September 25 & 27, 2001 Average (south of 99th Street)
(4) September 20-21, 2001 Average (south of 39th Street)
(5) May 15-17, 2001 Average (south of 99th Street)

Table 7
Facility Shares of Traffic at 99th Street Screenline

Time Period	I-5 South of 99th Street	I-205[1]	Others[2]
Peak Period Baseline Share	29%	61%	10%

[1]Measured near Mill Plain Interchange
[2]Includes Hazel Dell and Hwy 99

Beginning and Ending Transitions

This is a qualitative observation of traffic operations at the beginning and endpoints of the HOV lane. In the Baseline scenario, traffic operations were measured at points along the corridor where travel time/speed observations were also made, and at the area where the HOV lane would terminate. Observations were made during the 6 to 9 a.m. time period and are summarized below.

- On I-5 south of 99th Street, some queuing was observed. Speeds south of 99th Street slowed to approximately 40 mph.
- Traffic operations varied each day. Some queuing was observed as far north at the 78th Street Interchange on one day. On the other days, minor queuing was first observed in the vicinity of the Main Street Interchange area.
- Travel speeds from south of 99th Street to SR-500/39th Street generally averaged 48 mph.
- Minor queuing was observed south of SR-500/39th Street and average travel speeds dropped from 48 mph to 45 mph.
- Queuing began to increase south of 4th Plain and average travel speeds dropped to 38 mph.

- Queuing continued to increase and persist from Mill Plain south to the Interstate Bridge. Average travel speeds through this section dropped significantly and averaged approximately 24 mph.
- Traffic flow loosened slightly through the mid-point of the Interstate Bridge and travel speeds increased to 32 mph.
- Queuing again increased from the mid-point of the bridge to the south end of the bridge and queues continued through the Delta Park area. Travel speeds decreased to an average of 26 mph.

MODAL IMPACTS

These measures analyze shifts into carpools, vanpools, or transit.

HOV Lane Utilization

Currently, there is no HOV lane, so there is no HOV lane utilization. HOVs account for approximately 6 percent of the total number of vehicles on southbound I-5 in the a.m. Peak Hour (see **Table 1**).

Transit Ridership

C-Tran operates four routes that travel on I-5 southbound. These routes include 134, 156, 190, and 191. Current a.m. Peak Period transit ridership on these C-Tran routes is 576 passengers. It is expected that only the Route 134 busses will utilize the HOV lane, so ridership numbers will be reported separately for Route 134 and the other I-5 routes. Current a.m. Peak Period transit ridership on Route 134 is 415 passengers. Routes 156, 190, and 191 currently carry a combined ridership of 161 passengers during the a.m. Peak Period.

Number of Persons Per Vehicle

As shown in Total Person Throughput section, the Average Auto Occupancy is 1.06. Average Vehicle Occupancy is 1.12.

Average auto occupancy	=	total number of non-transit persons/total number of non-transit vehicles
Average auto occupancy	=	9,529/8,965 = 1.06
Average vehicle occupancy	=	total number of persons/total number of vehicles
Average vehicle occupancy	=	10,084/8,990 = 1.12

Park-and-Ride Use, Vanpools, and Employer Programs

Park-and-Ride Usage

Park-and-Ride usage can be used to measure the performance of the HOV lane. Changes in Park-and-Ride usage will be compared to changes in transit ridership to identify any patterns of increased or decreased transit usage.

Table 8
Park-and-Ride Usage

Location	Daily Usage (Vehicles)
Salmon Creek Park-and-Ride	439
Klineline Park	15

May 15-17, 2001 average

Vanpools and Employer Programs

C-Tran offers a vanpool service program. C-Tran subsidizes 25 percent of the lease cost for vanpools traveling to or from Clark County. C-Tran also subsidizes the entire cost of fuel for vanpools traveling to or from Clark County and provides car wash coupons free of charge to vanpools participants. Eight (8) commuter vanpools carrying 86 vanpool riders currently operate. All 8 vanpools carry passengers from Washington to Oregon. Those vanpools go to Farmers Insurance, Tektronics, and Fred Meyers. Approximately 3 people contacted C-Tran in September inquiring about the vanpool program. C-Tran staff believes these calls were made from people who had participated in the Tri-Met vanpool program. Tri-Met recently implemented changes in its vanpool program and these people were seeking information on the benefits offered by the C-Tran program.

The number of vanpools currently operating is significantly less than past years. In February 2000, 15 vanpools were operating from Clark County to the Portland area. C-Tran staff believes the decline in vanpools is attributable to the slowing economy and associated job decreases.

Tri-met no longer offers vanpool programs for residents or businesses of Washington.

PUBLIC PERCEPTIONS OF HOV LANE

Public opinion surveys will be taken to gauge public opinion about the HOV lane and HOV lanes in general before and during the Pilot Project. The first survey was commissioned in September 2001. Approximately 202 households were surveyed with a margin of error of ±6.89%. The following conclusions were drawn from the survey:

- Overall support of the WSDOT HOV lane was 58%, with 31% citing it is an excellent idea and 27% indicating it is a good idea. Approval was exceptionally high with those residents who carpool two or more days a week (73%). Support among those residents who typically drive alone was approximately 50%.
- Overall, 48% of the respondents believe the WSDOT HOV lane should be permanently adopted. Thirty-six percent (36%) of the respondents believe the WSDOT HOV lane should not be permanently adopted, while 16% of the sample is undecided. Fifty-six percent (56%) of Vancouver residents support permanent adoption of the WSDOT HOV lane, as do 48% of members of the Salmon Creek/Hazel Dell zip code cluster. The strongest opposition comes from Battle Ground with 48% of residents opposing the lane, and North Clark County with 46% opposed, while 16% of the sample is undecided.

- Sixty-six percent (66%) of the respondents surveyed agree that the ODOT HOV lane is an excellent or good idea, with a large percent of support coming from Vancouver with 75%, and Salmon Creek/Hazel Dell, 67%.
- Reasons most often cited for <u>support</u> of WSDOT permanent HOV lane adoption were:

  Encourages carpooling/benefits carpoolers
  Less traffic tie ups/less cars
  Get there faster/save time
  Traffic moves better/faster

- Reasons most often cited for <u>opposition</u> of WSDOT permanent HOV lane adoption were:

  Would cause more delays/worsen the problem
  Not fair to single drivers
  Not used enough/waste capacity of lane
  Bridge/Delta Park area is problem

The following commuter statistics were drawn from the survey:

- Nearly 80% of the residents interviewed commute on I-5 between the 99th Street interchange and the Interstate Bridge for work, 10% for school or shopping, and 10% for other reasons. A large portion of these residents, 57%, enters from South of the 99th Street interchange while almost 30% enter from the North.
- Ninety-six percent (96%) of those surveyed drive or carpool on I-5, traveling 25.4 minutes on average one way.
- Sixty-one percent (61%) of all commuters typically drive alone, while 25% usually drive or ride with someone else. The average number of passengers in a carpool is 2.6, with 58% of those who carpool two or more times per week traveling with family members.
- Vancouver residents usually drive or ride with someone else most often (37%) when compared to the other areas, like Salmon Creek/Hazel Dell where 20% of the respondents carpool.
- Citizens in Battle Ground and North Clark County typically drive alone (80% and 73% of their populations respectively). Seventy-eight percent (78%) of commuters who drive alone at least three days a week do so because their daily routines prevent them from carpooling or taking the bus, despite the fact that a large portion of the survey sample, 94%, are aware of HOV lanes in the Portland/Vancouver area.

CONCLUSION

Currently, HOVs and SOVs are traveling in the same travel lanes. Travel times are approximately 9 ½ minutes through the corridor. Traffic conditions observed during September are similar to conditions experienced in May.

Travel times for the corridor measured in September were slightly higher compared to May observations, possibly due to increased construction impacts. The largest increases were measured between 99th Street and 78th Street and near the approach to the Interstate Bridge.

Pre-opening public perception of the HOV lane is generally positive. Support is highest in Vancouver and the Hazel Dell/Salmon Creek area and somewhat lower in Battle Ground and north Clark County areas.

APPENDIX

Travel Time Methodology

The following is the methodology used for conducting travel time studies of the corridor. These were used to establish baseline conditions and will be used for the evaluation data collection.

1. Travel time runs begin at approximately 6 a.m. and end at approximately 9 a.m.
2. If there is an incident such as bad weather, construction, maintenance, or an accident that affects traffic, note it and continue the study. Note the weather, date, day of week, and time of the run. It is desirable that this be done at the beginning of each run.
3. Try to travel at the median speed. As necessary, pass slow moving vehicles and allow fast moving vehicles to pass, but try to make sure that an equal number of vehicles pass as are passed.
4. At each checkpoint, note the time. If the location gets cut off it can be deduced from the previous location by its order. If the time gets cut off and it cannot be figured out, the run will need to be done another day.